MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

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PROFESSOR ADAMS, F.R.S., in the Chair.

Edward Hamilton Pringle, Esq., Madras;
John Dyer, Esq., Rokeby Road, New Cross;
Robert Kalley Miller, Esq., Royal Naval College, Greenwich;
Rev. James Pearson, Fleetwood: and
Mortimer Evans, Esq., Glasgow,

were balloted for and duly elected Fellows of the Society.

A proposal has been communicated to the Council for placing, in Westminster Abbey or elsewhere, a Memorial to Jeremiah Horrox, the first observer of a transit of *Venus*. The President intended to mention this at the evening meeting, but inadvertently omitted to do so.

Dry Plate Process for Solar Photography. By Capt. W. de W. Abney, R.E.

Before commencing the preparation of the plates, some fresh eggs (say four for a dozen medium sized plates) are procured, and the whites carefully beaten up (with one drachm of liquid ammonia to each white) by a whisk, a bundle of quill pens, or by shaking in a bottle, into which fragments of glass have been introduced. When the froth has subsided, the clear fluid is procured by filtering through muslin, and is placed in a bottle labelled A. A glass of bitter or mild ale is next obtained, and to half of it (which should be 5 oz.) 10 grains of pyrogallic acid

are added, and the solution, if necessary, is filtered through filter-paper. This is lettered P. The other 5 oz. of beer are placed in another bottle, and labelled B.

Should the fresh eggs not be obtainable, dried albumen may be used; 20 to 25 grains of the latter should be dissolved in an ounce of distilled water, and substituted for them.

Bottled beer may also be substituted for the ordinary bitter ale. Care should be taken that, by a gentle heat, the carbonic acid is all liberated, otherwise carbonate of ammonia will be formed on the addition of alkaline albumen.

(i.) Any ordinary collodion will answer. The bromo-iodized sample, supplied by Thomas of Pall Mall, with 2 grains of pyroxyline added to each ounce, gives very rapid results.

For sun pictures, however, a modification is advisable; and much will depend on the climate in which it has to be employed.

(ii.) For a cold climate, collodion made by the following formula will be found to give good results:—

Thomas's bromized collodion	20 oz.
,, ordinary bromo-iodized	20 oz.
Plain collodion, *not* iodized	6 oz.
Pyroxyline	276 grains.
Water	400 minims.

(iii.) For warmer climates the following will be found to answer better:—

Thomas's bromized collodion	20 oz.
,, bromo-iodized	20 oz.
* Alcohol, S. G. ·850	6 to 8 oz.
Pyroxyline	300 grains.
Water	120 minims.

With (i.) the ordinary nitrate of silver bath, 40 grains to the ounce, is used. If greater sensitiveness is required, 10 grains of nitrate of uranium to each fluid ounce of the above are added.

With (ii.) and (iii.) the above bath should be used, together with another made 60 grains to the ounce of water.

A substratum to the collodion is recommended to insure adhesion of the film to the glass plate during development. This is made by mixing the white of one egg with 40 oz. of distilled water, and applying it to the surface of the plate by a piece of swan's down, calico, or flannel, folded over the edge of a strip of glass and used as a brush. The brush is dipped in the fluid, and drawn down the plate in parallel lines till the whole surface has received a coating. Here I may mention that a *clean* plate is necessary; but much polishing with a silk handkerchief or chamois prevents the substratum taking kindly to the glass.

* The hotter the climate, the more alcohol will be required.

Another substratum, which seems to give almost better results than the albumen, may be substituted for the above :—

Sheet gelatine	75 grains.
Distilled water	60 oz.
Ammonia	$\frac{1}{4}$ oz.
Alcohol	1 oz.

The gelatine should be softened in 30 oz. of cold water, and then dissolved by 30 oz. of boiling water. When cold, the remaining ingredients should be added.

If a plate (after the substratum has been thoroughly dried) is coated with collodion (i.), it is sensitized in the ordinary manner in the 40-grain bath, *i.e.*, for about 4 minutes in cold to $2\frac{1}{2}$ in warm weather. If the plate has been coated with (ii.) or (iii.), it is plunged in the 40-grain bath and kept there till all "greasiness" has disappeared. It is then transferred to the 60-grain bath, and kept there for 7 or 8 minutes longer, *i.e.*, until a creamy film is obtained. The plate is next plunged into distilled water, or spring water which has been rendered slightly alkaline by adding a few drops of ammonia to it (if iron be present as an impurity), and to which, *after boiling and filtering*, a few drops of nitric acid have been added to restore neutrality. When the "greasiness" has disappeared from the film, the plate may be washed under the tap for a minute, or in different dishes of water, until all free nitrate of silver is got rid of. (This may be effected rapidly by adding a pinch or two of common salt to the last washing water but one in the dishes.) In a small tumbler are next mixed equal quantities of A and B, stirred up with a glass rod, and floated over the washed film. If all the nitrate have not been washed away, stains may here become manifest. This solution is kept on half a minute, and is then poured off. The plate is once more thoroughly washed, and solution P is floated over for another half minute. The plate is then set up on one corner to dry spontaneously. Before being stored away, the last trace of moisture may be expelled by gently warming over a stove or Bunsen burner. In dry climates this precaution need not be taken. As a rule, the plate requires no "backing" to prevent blurring of the image, but if it appear very transparent a backing may be necessary. Cartridge-paper stained with any red dye (alkaline aurine will answer), and coated with gum and flour stained of the same colour, will give what is required. When damped, the paper will adhere to the back of the plate, and dry in optical contact with it. It can easily be removed by wetting.

The exposure is the same as that necessary for a wet plate prepared with the same collodion, though no damage will be done to the picture if six times that amount be given. With the uranium-bath the dry plate is quicker than a wet plate.

The development need not take place for a month after exposure. The following solutions must be made up :—

No. I.	pyrogallic acid	12 grains.
	water	1 oz.
No. II.	liquor ammonia	1 part.
	water	4 parts.
No. III.	citric acid	60 grains.
	glacial acetic acid	30 minims.
	water	1 oz.
No. IV.	nitrate of silver	20 grains.
	water	1 oz.

The plate is washed in spring or rain water of a not less temperature than 60° F. till all the beer has been removed. Sufficient of No. I. is taken to well cover the plate, and first flowed over it. Into the developing cup are then dropped three drops of No. II., and No. I. is poured off the plate on to it. The solution is then flowed over the plate again, and after a few seconds the detail will begin to appear by *reflected* light. As detail appears, another two drops of No. II. may be added, and so on, till *nearly* all the detail is visible. The plate is now washed in water of the same temperature. Here it may be remarked that stronger doses of No. II. may be used to under-exposed pictures. Six drops of No. III. are next dropped into a clean developing cup, and the same quantity of No. I. added as before. This is flowed over the plate to neutralise any trace of ammonia remaining. Into the cup are now dropped two drops of No. IV., the pyro-solution from the plate poured on to it, and once more applied to the film. The image will gradually acquire strength, the remaining detail appearing. The intensity is gained by adding to the same, or fresh (*acid*) pyro-solution more silver (No. IV.) When the image appears of sufficient density, it is fixed with a solution of hyposulphite of soda or cyanide of potassium. In the case where the plate is backed, the film should be wetted first, and then the paper removed.

The alkaline development produces a faint image by the reduction of the organic salt and bromide of silver to the suboxide of silver. The iodide is unattacked by it. The acid silver development utilises the exposed iodide thus: the attraction of the suboxide for fresh silver (deposited by the acid development) is increased by the irritated iodide, and thus density is acquired.

It will be noticed that no restrainer, such as bromide of potassium, is used with the alkaline development. The albumen dissolved by the ammonia plays the part of a retarder, but not of a destroyer. Thus the image is well under control.

An *under*-exposed picture has an image of slate colour; an *over*-exposed picture has one of an olive green; whilst one properly exposed is of a rich chocolate brown. Every plate sufficiently exposed will yield a good negative.

Greenwich,
1874, *7th March.*

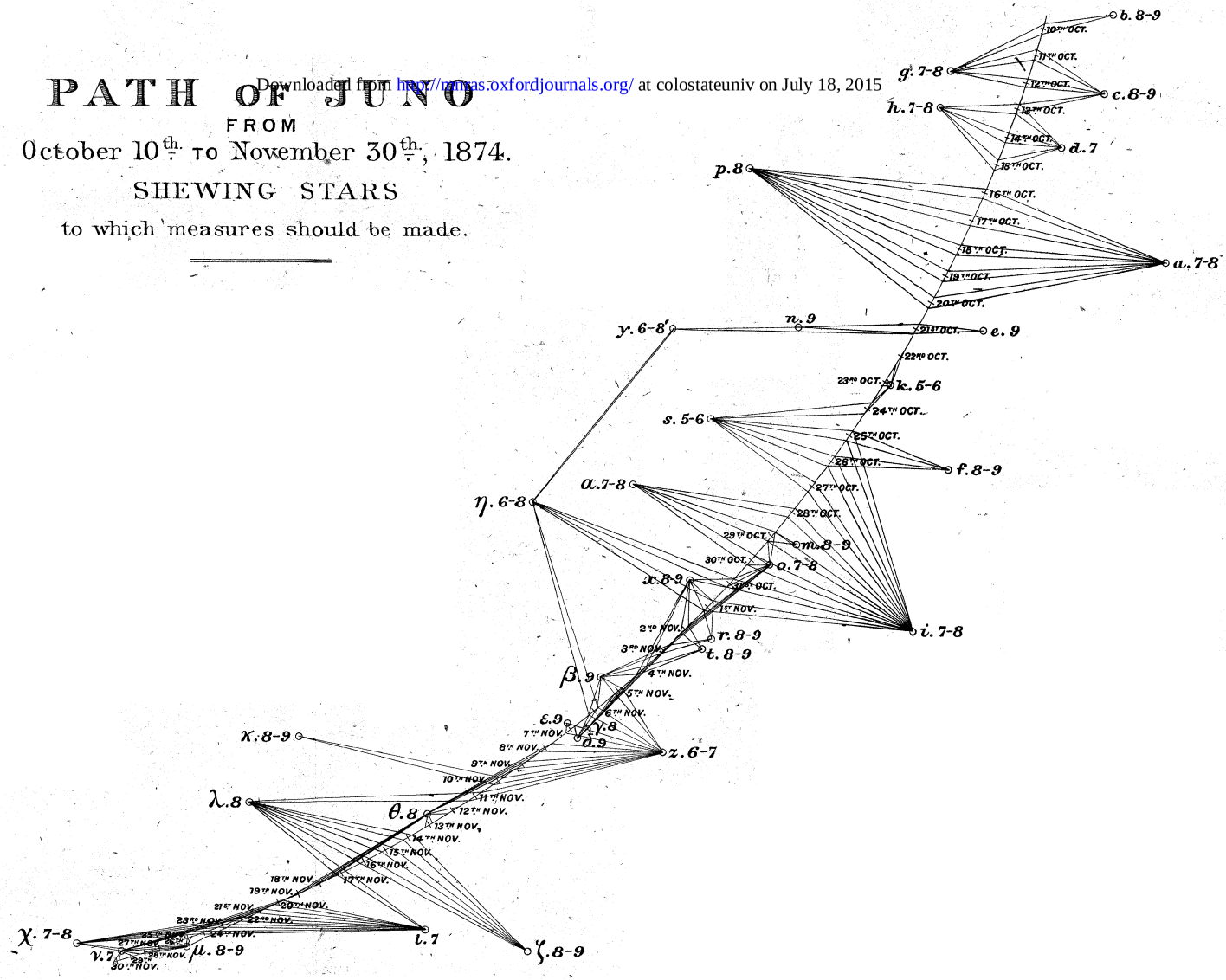
PATH OF JUNO

FROM

October 10th. to November 30th., 1874.

SHEWING STARS

to which measures should be made.



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